PATENT ABSTRACTS OF JAPAN

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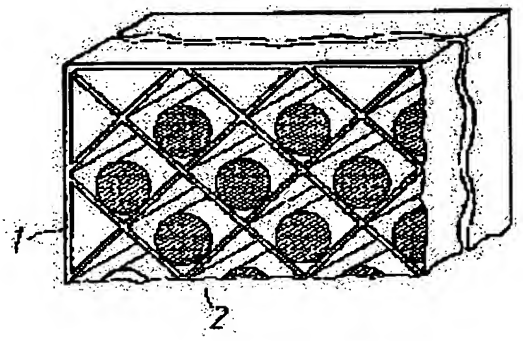
(71)Applicant : TOKIN CORP
(72)Inventor : MATSUZAWA HIDEKI

4) METHOD FOR DEWAXING AND SINTERING MOLDED BODY OF METAL OR CERAMIC POWDER

7)Abstract:
JRPOSE: To prevent the deformation of molded bodies at the time of waxing and sintering and to obtain sintered compacts excellent in nensional precision by using a setter having a honeycomb structure as a tter for setting the molded bodies.
ONSTITUTION: When molded bodies 2 formed by injection molding or trusion molding are dewaxed and sintered, a setter 1 having a neycomb structure is used and the molded bodies 2 are set in many les arranged in the horizontal direction of the setter 1. It is not cessary to pile up setters, handling is facilitated and production ficiency is enhanced. Sintered compacts excellent in dimensional ecision are obtd. without causing warping or waving in the longitudinal rection by imparting a V-shaped groove structure to the bottoms of the les in the setter 1.



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.AIMS

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laim(s)]
laim 1] the process which degreases and sinters the Plastic solid which fabricated the admixture which mixed and eaded a metal or ceramic powder, and an organic high molecular compound with the binder used as a principal nponent, and pelletized it by injection molding or extrusion molding -- the cleaning / sintering approach of the metal aracterized by to be and to lay in this hole of the setter who has the abbreviation honeycomb structure which ablished this Plastic solid for many holes horizontally, or a ceramic powder-molding object.
laim 2] The cleaning / sintering approach of the metal characterized by the base of said setter's hole making a V aracter-like slot, or a ceramic powder-molding object.

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:TAILED DESCRIPTION

:tailed Description of the Invention]
)01]
dustrial Application] This invention offers the cleaning / sintering approach which deformation does not produce
)ecially about the approach of manufacturing the sintered product of a metal or ceramic powder.
)02]
escription of the Prior Art] The Plastic solid which generally presents sintering with the sintered product of a metal or
: ceramics in the process manufactured with powder-metallurgy processing is acquired as a green compact by
:ssing raw material powder. This needs to give back processes, such as cutting and grinding, to the product of a
tering riser, for it is restricted to a thing comparatively simple as a configuration of the Plastic solid acquired and
taining the product of a more complicated configuration from it being the approach of pressurizing the raw material
wder with which metal mold was usually filled up by punch from the upper and lower sides.
)03] although the technique for acquire the Plastic solid of the complicated configuration which be acquire with a
ıvention method that such a trouble should be solve be examine variously , after add the binder which used the 10 -
wt% organic high molecular compound as the principal component to raw material powder in the field of ceramics
ıter on the so-called engineering ceramics etc. and mix and knead , the method of degrease and sinter injection
)lding or the Plastic solid which carried out extrusion molding , and obtain a product be begin be perform
lustrially . Although injection molding and extrusion molding accomplish development as a method of fabricating
ıstics, since it is suitable for moreover producing a product without post processing in large quantities with close
nensional accuracy, there are some which should be observed as a solution of the above troubles. And it supports to
: development of the manufacturing technology of metal powder and a binder combination technique represented by
: method of atomizing in recent years, and application has been tried for this process by the sintered product of a
:tal and the ceramics.
)04] Although the difference between the approach of using the Plastic solid by this injection molding and extrusion
)lding for sintering and the approach of sintering the conventional compression-molding object of the fabricating
:thods differing is natural, since a lot of [a Plastic solid] binders are contained, before sintering, in the former, it is
/ing a debinder, i.e., cleaning. Incidentally, by the latter, since it is **** small quantity even when a Plastic solid
mpletely contains, excluding a binder, direct sintering can be carried out. And although it is the conventional general
proach for this cleaning approach to heat a Plastic solid gradually, and to vaporize a binder as cracked gas, in order
: programming rate at this time has too rapid generating of cracked gas in it being size too much and to cause
formation of a blister, a crack, etc. to a Plastic solid, it is necessary to make it into 5-15 degrees C / hr extent.
)05] However, when becoming a problem here laid a Plastic solid on a setter and it degreased, the field in contact
th a setter had the large diffused resistor of the cracked gas of a binder, was in the condition of being hard to escape
)m cracked gas, and expansion in a cleaning process differed from contraction behavior in the part which does not
ıch a setter, and it had the fault of producing deformation of camber, a wave, etc. in a Plastic solid. Especially
pending on the Plastic solid, camber, a wave, etc. to a longitudinal direction became large, the Plastic solid was laid in
izogami, the setter who generally gave the slot of V typeface as this cure, cleaning and by sintering, there is no
formation of camber, a wave, etc. in a Plastic solid, and the product which was excellent in truth direct precision has
en obtained. However, if a setter is accumulated when degreasing using such a setter, since it is bulky, productive
ficiency is not bad fit for mass production.
)06]
roblem(s) to be Solved by the Invention] This invention was made that the problem of the deformation produced in
se the Plastic solid acquired by injection molding or extrusion molding is degreased and sintered should be solved,

l aims at offering the approach of manufacturing the sintered compact excellent in dimens[illegible]l accuracy with fficient mass-production nature.

)07]

eans for Solving the Problem] This invention is the cleaning / sintering approach of the metal characterized by to ry out insertion installation into the hole of a large number which used what has honeycomb structure as a setter who s this Plastic solid, and were prepared in said setter's horizontal direction, or a ceramic powder-molding object in the ›cess which degreases the Plastic solid which fabricated the admixture which mixed, kneaded and pelletized the ıder which uses a metal or ceramic powder, and an organic high molecular compound as a principal component by ection molding or extrusion molding.

)08] Although the hole is generally perpendicularly turned and installed as a usage of the setter who has honeycomb ıcture and a Plastic solid is laid on it, in this invention, in the hole located in a line with the horizontal direction of the ter who has honeycomb structure, a Plastic solid is inserted, respectively and is laid. Since the pile of a setter is ıecessary like [at the time of using a monotonous setter by degreasing and sintering by this approach], there is no lk burr, handling is easy, and can gather productive efficiency, and the manufacturing method which was very :ellent in mass-production nature is offered. Moreover, as well as the case where the setter of a monotonous form ıo gave the slot of V typeface by making into the slot structure of V typeface the pars basilaris ossis occipitalis of the le established in the setter is used since a Plastic solid is supported by the slot, the sintered compact which excelled ›ngitudinal direction] in the truth direct precision which is not produced [wave / camber,] is obtained.

)09]

ınction] By making into honeycomb structure the setter who uses the admixture which mixed, kneaded and pelletized ıetal or ceramic powder, and a binder in case injection molding or the Plastic solid which carried out extrusion ›lding is degreased and sintered Since a Plastic solid can be laid in each of the through tube of a large number opened rizontally By productive efficiency improving the pars basilaris ossis occipitalis of a horizontal through tube as the ·t structure of a V character mold, since many Plastic solids can be processed at a stretch like [in the case of the setter a monotonous form like before], without accumulating a setter and The sintered compact which camber, a wave, etc. a longitudinal direction did not start but was excellent in truth direct precision is obtained.

)10]

xample] Next, the example of this invention is explained to a detail with reference to a drawing.

)11]

xample 1] Drawing 1 is the partial perspective view having shown the installation condition of Plastic solid 2 to the ter 1 who has the honeycomb structure concerning the example 1 of this invention.

)12] The raw material for shaping was obtained by pelletizing in die length of about 4mm, after the mean diameter eaded dioctyl phthalate 1wt% at 130 degrees C with the pressurized kneader with a melting point of 60 degrees C raffin wax 3wt% for 30 minutes ethylene-vinylacetate copolymer 5vinyl acetate content 20wt% wt% as a binder to :kel-Zn ferrite temporary-quenching powder 91wt% which is 0.5 micrometers. Plastic solid 2 of the shape of a linder which has the shape of a phi3mm cross section for this raw material with an extruding press machine (the ımeter of a screw: 30mm, ratio-of-length-to-diameter:22) was produced. In addition, the barrel temperature of an truding press machine was set as 130 degrees C with the band heater. In degreasing this Plastic solid 2, it cut to 50mm the longitudinal direction, and as shown in drawing 1 , the cross section inserted and laid in the hole of the setter 1 ıo has the honeycomb structure made from an alumina which has the hole of a grid configuration (3.5mmx3.5mm). is was installed in the cleaning furnace, and it heated with the programming rate of 5 degrees C/hr in atmospheric air, d degreased by carrying out furnace cooling after 1-hour maintenance at 300 degrees C. Furthermore, sintering was rformed for this at 1100 degrees C for 3 hours. The sintered compact of the nickel-Zn ferrite which becomes a ıgitudinal direction by this diameter phiof cross section2.65mm and die length of 45mm which are not produced vave / camber,], and the consistency of 5.20g/ml was obtained.

)13]

xample 2] Drawing 2 is the partial front view having shown the installation condition of Plastic solid 21 to the setter who has the honeycomb structure concerning the example 2 of this invention.

)14] as the raw material for shaping -- Fe50wt%-Co50wt% -- the alloy of a presentation was ingoted by high-:quency heating in the argon gas ambient atmosphere, the powder produced to an average of 10 micrometers by the ıter atomizing method was used, dioctyl phthalate 2wt% was used to this powder 88wt% with a melting point of 60 grees C paraffin wax 5wt% polymethacrylic acid butyl 5wt% as a binder, and the raw material pellet was produced by : same approach as an example 1. Plastic solid 21 of a configuration with which a cross-section configuration has this th an injection molding machine, and die length has 70mm by 1.0mmx3.0mm was fabricated. It laid in the hole of the

ter 11 who has the honeycomb structure made fr[redacted]a zirconia which has the hole section [redacted]e grid configuration ose cross-section configuration is 4.0mmx4.0mm about this Plastic solid 21. This was installed in the cleaning nace, and it heated with the programming rate of 5 degrees C/hr in the argon gas ambient atmosphere, and degreased cooling after 3-hour maintenance at 400 degrees C. Furthermore, sintering was performed for this at 1200 degrees C 2 hours. The sintered compact of the Fe50wt%-Co50wt% alloy with which the cross-section configuration which is : produced [wave / camber,] becomes a longitudinal direction by this 0.85mmx2.55mm, die length of 59.5mm, and consistency of 7.90g/ml was obtained.

)15]

(ample 3] Drawing 3 is the partial front view having shown the installation condition of Plastic solid 22 to the setter who has the honeycomb structure concerning the example 3 of this invention.

)16] As a raw material for shaping, as a binder, with a melting point of 60 degrees C paraffin wax 2wt%, the mean meter used dioctyl phthalate 1wt%, and produced the raw material pellet by the same approach as an example 1 thacrylic-acid butyl 2.5wt% to lead titanate-lead zirconate (PZT) temporary-quenching powder 92wt% which is 0.1 crometers ethylene-acetic-acid PINI copolymer 2.5vinyl acetate content 14wt% wt%. With the same extruding press chine as what used this raw material in the example 1, two sides fabricated the triangle pole 22 which has the cross- tion configuration of the rectangular equilateral triangle which is 2mm. In degreasing this Plastic solid 22, it cut to nm by the longitudinal direction, and inserted and laid in the hole of the setter 12 who has the honeycomb structure de from an alumina which has the hole of a grid configuration whose cross-section configuration is 2.5mmx2.5mm. is was installed in the cleaning furnace, and it heated with the programming rate of 3 degrees C/hr in atmospheric air, l degreased by carrying out furnace cooling after 3-hour maintenance at 550 degrees C. Furthermore, sintering was formed for this at 1200 degrees C for 2 hours. This obtained the sintered compact of PZT which is the cross-section nfiguration of a rectangular equilateral triangle where two sides which are not produced [wave / camber,] are 5mm and which becomes die length of 17.4mm, and the consistency of 7.8g/ml to the longitudinal direction.

)17]

fect of the Invention] As stated to the detail above, according to cleaning and the sintering process by this invention, manufacture of the sintered product of the metal fabricated by injection molding or extrusion molding, or a ceramic wder-molding object, there is no deformation, a sintered product with sufficient dimensional accuracy can be)duced efficiently, and it is very useful on industry. In addition, although a nickel-Zn ferrite, a Mn-Zn ferrite, barium nate, etc. can use iron, a Fe-Co alloy, a Fe-Si alloy, Sendust, etc. in a metal as raw material powder for shaping in the amics in this invention, it is not limited to these. Furthermore, in this invention, as a binder mixed with raw material wder, although various kinds of polyolefines, a copolymer, a wax, etc. can be used, in consideration of the grain size raw material powder, front-face nature, etc., it is chosen suitably. Furthermore, although an alumina, a zirconia, etc. ı be used as a setter's quality of the material to be used, it is not limited to these.

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AWINGS

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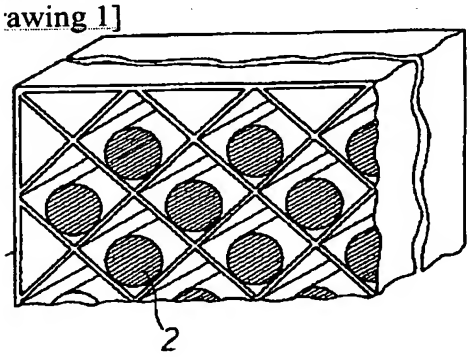

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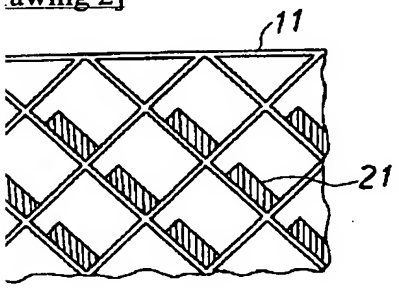

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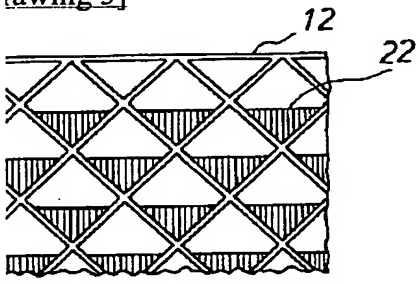

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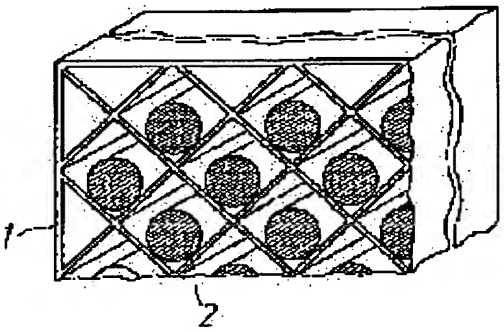
(57)Abstract:
PURPOSE: To prevent the deformation of molded bodies at the time of dewaxing and sintering and to obtain sintered compacts excellent in dimensional precision by using a setter having a honeycomb structure as a setter for setting the molded bodies.
CONSTITUTION: When molded bodies 2 formed by injection molding or extrusion molding are dewaxed and sintered, a setter 1 having a honeycomb structure is used and the molded bodies 2 are set in many holes arranged in the horizontal direction of the setter 1. It is not necessary to pile up setters, handling is facilitated and production efficiency is enhanced. Sintered compacts excellent in dimensional precision are obtd. without causing warping or waving in the longitudinal direction by imparting a V-shaped groove structure to the bottoms of the holes in the setter 1.



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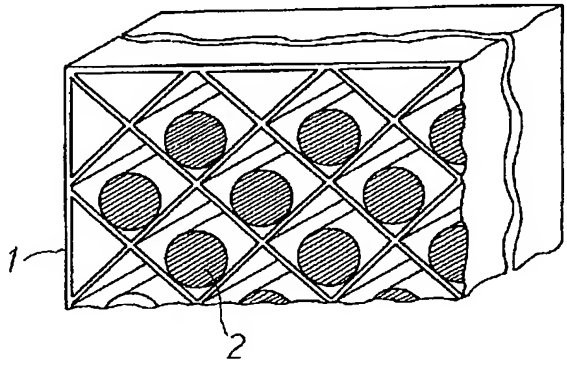
(71)出願人　000134257
株式会社トーキン
宮城県仙台市太白区郡山６丁目７番１号

(72)発明者　松沢　秀樹
宮城県仙台市太白区郡山６丁目７番１号
株式会社トーキン内

(54)【発明の名称】　金属またはセラミックス粉末成形体の脱脂・焼結方法

(57)【要約】
【目的】　射出成形または押出成形により得られた成形体を脱脂･焼結する際に生じる変形を防止し、寸法精度に優れた焼結体を量産性良く製造する方法を供する。
【構成】　脱脂･焼結の際に使用されるセッター１を水平方向に多数の空孔を設けたハニカム構造とし、該空孔内各々に成形体２を挿入、載置する脱脂･焼結方法である。



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【特許請求の範囲】

【請求項１】　金属またはセラミックス粉末と有機高分子化合物を主成分とするバインダーと混合・混練しペレット化した混和物を射出成形または押出成形により成形した成形体を脱脂・焼結する工程おいて、該成形体を、水平方向に多数の空孔を設けた略ハニカム構造を有するセッターの該空孔内に載置することを特徴とする金属またはセラミックス粉末成形体の脱脂・焼結方法。

【請求項２】　前記セッターの空孔の底面がＶ字状の溝をなすことを特徴とする金属またはセラミックス粉末成形体の脱脂・焼結方法。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、金属またはセラミックス粉末の焼結製品を製造する方法に関し、特に変形の生じない脱脂・焼結方法を提供するものである。

【０００２】

【従来の技術】一般に、金属またはセラミックスの焼結製品を粉末冶金法によって製造する工程において、焼結に供する成形体は原料粉末を圧縮成形することにより圧粉体として得られている。これは通常金型に充填した原料粉末を上下方向からパンチで加圧するという方法であることから、得られる成形体の形状としては比較的単純なものに限られ、より複雑な形状の製品を得るには焼結上がりの製品に切削、研削等の後工程を施す必要がある。

【０００３】このような問題点を解決すべく、従来法で得られない複雑形状の成形体を得るための技術が種々検討されているが、いわゆるエンジニアリングセラミックス等を中心とした窯業製品の分野においては原料粉末に１０～２０ｗｔ％の有機高分子化合物を主成分としたバインダーを加え、混合・混練した後、射出成形もしくは押出成形した成形体を脱脂・焼結して製品を得るという方法が工業的に行われ始めている。射出成形・押出成形はプラスチックの成形法として発展を遂げてきたものであるが、製品を後加工なしで、しかも高い寸法精度で大量に生産するのに適しているため、前述のような問題点の解決策として注目すべきものがある。そして、近年のアトマイズ法に代表される金属粉末の製造技術やバインダー配合技術の発展に支えられて、この製法が金属およびセラミックスの焼結製品にも適用が試みられてきている。

【０００４】この射出成形・押出成形による成形体を焼結に使用する方法と従来の圧縮成形体を焼結する方法の相違点は成形法が異なることは勿論であるが、前者では成形体が多量のバインダーを含有するため焼結する前に脱バインダー、即ち脱脂を施す必要があることである。ちなみに後者では、成形体が全然バインダーを含まないか、含む場合でも極く少量なので直接焼結することができる。そしてこの脱脂方法は成形体を徐々に加熱してバ

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インダーを熱分解ガスとして揮散させるというのが従来の一般的な方法であるが、この時の昇温速度はあまりに大であると熱分解ガスの発生が急激すぎて成形体にふくれや割れ等の変形を引き起こすため、５～１５℃／ｈｒ程度とする必要がある。

【０００５】しかし、ここで問題となるのは成形体をセッター上に載置して脱脂する際、セッターと接触している面はバインダーの分解ガスの拡散抵抗が大きく、分解ガスが抜けにくい状態にあり、セッターと接触していない部分とで脱脂過程での膨張、及び収縮挙動が異なってしまい、成形体にそり・うねり等の変形を生じてしまうという欠点があった。特に成形体によっては長手方向に対するそり・うねり等が大きくなり、一般にこの対策としてＶ字形の溝を施したセッターの溝上に成形体を載置して脱脂・焼結することにより成形体にそり・うねり等の変形がなく、真直精度の優れた製品を得ている。しかし、このようなセッターを使用して脱脂を行う場合、セッターを積み重ねると、かさばるため生産効率が悪く量産には向いていない。

【０００６】

【発明が解決しようとする課題】本発明は、射出成形または押出成形により得られた成形体を脱脂・焼結する際に生じる変形の問題を解決すべくなされたもので、寸法精度に優れた焼結体を量産性良く製造する方法を提供することを目的とする。

【０００７】

【課題を解決するための手段】本発明は、金属またはセラミックス粉末と有機高分子化合物を主成分とするバインダーとを混合・混練・ペレット化した混和物を射出成形または押出成形により成形した成形体を脱脂する工程において、該成形体を載置するセッターとしてハニカム構造を有するものを使用し、前記セッターの水平方向に設けられた多数の空孔内に挿入載置することを特徴とする金属またはセラミックス粉末成形体の脱脂・焼結方法である。

【０００８】一般に、ハニカム構造を有するセッターの使用法としては、その空孔を垂直方向に向けて設置し、その上に成形体を載置するものであるが、本発明では成形体をハニカム構造を有するセッターの水平方向に並んだ空孔内にそれぞれ挿入し載置するものである。この方法により脱脂・焼結することで、平板のセッターを使用した場合のようにセッターの積み重ねが不要なことから、かさばりがなく取扱いが容易で生産効率を上げることができ、量産性に非常に優れた製造法が提供される。又、セッターに設けた空孔の底部をＶ字形の溝構造とすることにより、Ｖ字形の溝を施した平板形のセッターを使用した場合と同様に成形体は溝部に支持されるため、長手方向にそり・うねり等の生じない真直精度の優れた焼結体が得られる。

【０００９】

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【作用】金属またはセラミックス粉末とバインダーとを混合・混練・ペレット化した混和物を射出成形または押出成形した成形体を脱脂・焼結する際に使用するセッターをハニカム構造とすることにより、水平方向にあけられた多数の貫通孔の各々に成形体を載置できるので、多数の成形体を、従来のような平板形のセッターの場合のように、セッターを積み重ねることなく、一時に処理できるので生産効率が良く、又、水平方向の貫通孔の底部をV字型の溝構造とすることにより、長手方向のそり・うねり等がおこらず真直精度の優れた焼結体が得られる。

【0010】

【実施例】次に、本発明の実施例について図面を参照して詳細に説明する。

【0011】

【実施例1】図1は、本発明の実施例1に係わるハニカム構造を有するセッター1への成形体2の載置状態を示した部分斜視図である。

【0012】成形用の原料は平均粒径が0.5μmのNi－Znフェライト仮焼粉91wt%に対して、バインダーとして酢酸ビニル含量20wt%のエチレン－酢酸ビニル共重合体5wt%、融点60℃のパラフィンワックス3wt%、ジオクチルフタレート1wt%を加圧ニーダーにより130℃で30分混練した後、長さ約4mmにペレット化することにより得た。この原料を押出成形機（スクリュー径：30mm、L／D：22）によりφ3mmの断面状を有する円柱状の成形体2を作製した。尚、押出成形機のバレル温度はバンドヒーターにより130℃に設定した。該成形体2を脱脂するにあたり長手方向で50mmに切断し、図1に示すように、断面が格子形状（3.5mm×3.5mm）の空孔を有するアルミナ製のハニカム構造を有するセッター1の空孔内に挿入し載置した。これを脱脂炉内に設置し、大気中にて5℃／hrの昇温速度で加熱し、300℃で1時間保持後、炉冷することにより脱脂を行った。更に、これを1100℃で3時間焼結を行った。これにより長手方向にそり・うねり等の生じない、断面径φ2.65mm、長さ45mm、密度5.20g／ミリリットルなるNi－Znフェライトの焼結体を得た。

【0013】

【実施例2】図2は、本発明の実施例2に係わるハニカム構造を有するセッター11への成形体21の載置状態を示した部分正面図である。

【0014】成形用の原料として、Fe50wt%－Co50wt%なる組成の合金をアルゴンガス雰囲気中で高周波加熱により溶製し、水アトマイズ法により平均10μmに作製した粉末を使用し、該粉末88wt%にバインダーとしてポリメタクリル酸ブチル5wt%、融点60℃のパラフィンワックス5wt%、ジオクチルフタレート2wt%を使用し、実施例1と同様な方法で原料ペレットを作製した。これを射出成形機により断面形状

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が1.0mm×3.0mmで長さが70mmを有する形状の成形体21の成形を行った。該成形体21を断面形状が4.0mm×4.0mmの格子形状の空孔部を有するジルコニア製のハニカム構造を有するセッター11の空孔内に載置した。これを脱脂炉内に設置し、アルゴンガス雰囲気中にて5℃／hrの昇温速度で加熱し、400℃で3時間保持後、冷却することにより脱脂を行った。更に、これを1200℃で2時間焼結を行った。これにより長手方向にそり・うねり等の生じない、断面形状が0.85mm×2.55mm、長さ59.5mm、密度7.90g／ミリリットルなるFe50wt%－Co50wt%合金の焼結体を得た。

【0015】

【実施例3】図3は、本発明の実施例3に係わるハニカム構造を有するセッター12への成形体22の載置状態を示した部分正面図である。

【0016】成形用の原料として平均粒径が0.1μmのチタン酸鉛－ジルコン酸鉛（PZT）仮焼粉92wt%に対して、バインダーとしてメタクリル酸ブチル2.5wt%、酢酸ビニル含有14wt%のエチレン－酢酸ビニ共重合体2.5wt%、融点60℃のパラフィンワックス2wt%、ジオクチルフタレート1wt%を使用し、実施例1と同様な方法で原料ペレットを作製した。この原料を実施例1で使用したものと同様の押出成形機により、二辺が2mmの直角二等辺三角形の断面形状を有する三角柱22の成形を行った。該成形体22を脱脂するにあたり長手方向で20mmに切断し、断面形状が2.5mm×2.5mmの格子形状の空孔を有するアルミナ製のハニカム構造を有するセッター12の空孔内に挿入し載置した。これを脱脂炉内に設置し、大気中にて3℃／hrの昇温速度で加熱し、550℃で3時間保持後、炉冷することにより脱脂を行った。更に、これを1200℃で2時間焼結を行った。これにより長手方向にそり・うねり等の生じない、二辺が1.75mmの直角二等辺三角形の断面形状である、長さ17.4mm、密度7.8g／ミリリットルなるPZTの焼結体を得た。

【0017】

【発明の効果】以上詳細に述べたように、本発明による脱脂・焼結法によれば、射出成形または押出成形によって成形した金属またはセラミックス粉末成形体の焼結製品の製造において、変形がなく寸法精度の良い焼結製品を効率良く生産でき、工業上、非常に有益である。なお、本発明においては成形用原料粉末として、セラミックスにおいてはNi－Znフェライト、Mn－Znフェライト、チタン酸バリウム等、金属においては鉄、Fe－Co合金、Fe－Si合金、センダスト等が使用できるが、これらに限定されるものではない。更に本発明において、原料粉末と混合されるバインダーとしては、各種のポリオレフィン、コポリマー、ワックス等が使用できるが、原料粉末の粒度、表面性等を考慮して適宜選択

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される。更に、使用するセッターの材質としてはアルミナ、ジルコニア等が使用できるが、これらに限定されるものではない。

【図面の簡単な説明】

【図1】本発明の実施例1に係わるハニカム構造を有するセッターへの成形体の載置状態を示した斜視図。

【図2】本発明の実施例2に係わるハニカム構造を有するセッターへの成形体の載置状体を示した正面図部分断面図。

【図3】本発明の実施例3に係わるハニカム構造を有するセッターへの成形体の載置状体を示した正面図部分断面図。

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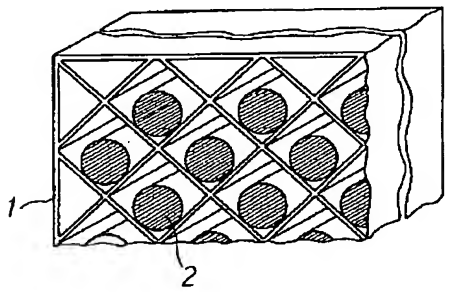
【符号の説明】

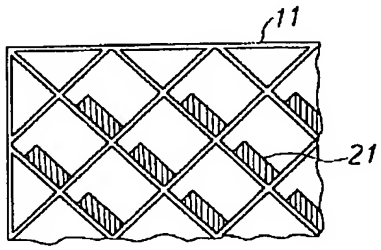
1，11，12　　セッター

2，21，22　　成形体

【図1】



【図2】



【図3】